

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
10 February 2005 (10.02.2005)

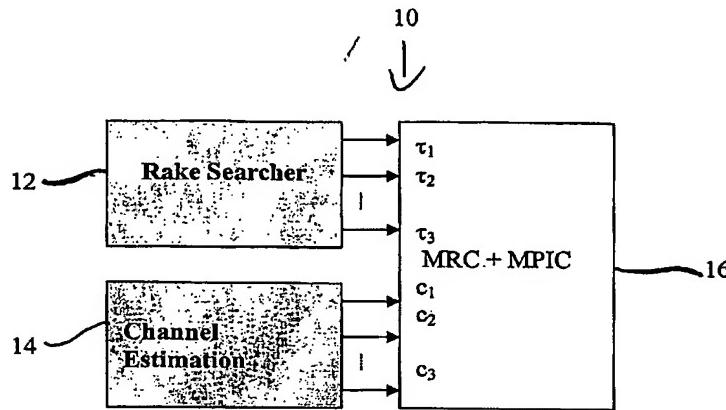
PCT

(10) International Publication Number
WO 2005/013626 A2

- (51) International Patent Classification⁷: **H04Q**
- (21) International Application Number: **PCT/US2004/023665**
- (22) International Filing Date: 26 July 2004 (26.07.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/491,294 31 July 2003 (31.07.2003) US
- (71) Applicant (for all designated States except US): **SAND-BRIDGE TECHNOLOGIES, INC. [US/US]**; 1 North Lexington Avenue, 10th Floor, White Plains, NY 10601 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **IANCU, Daniel [US/US]**; 91 Lake Street, Pleasantville, NY 10570 (US).
- (74) Agent: **PALAN, Perry; Barnes & Thornburg LLP, 750 17th Street, N.W., Suite 900, Washington, DC 20006 (US).**
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,

[Continued on next page]

(54) Title: RAKE RECEIVER WITH MULTI-PATH INTERFERENCE ACCOMMODATION



$$\hat{\tau}_l \text{ (a)} \quad \hat{c}_l \text{ (b)} \quad \mathbf{R}_{ff}(\tau_l - \hat{\tau}_0) \text{ (c)} \quad \mathbf{R}_{ff}^{-1}(\tau_k - \hat{\tau}_0) \text{ (d)} \quad \Lambda_{ss}^H(\hat{\tau}_k) \text{ (e)} \quad \tilde{\mathbf{n}}(\tau) \text{ (f)}$$

$$\psi(\tau) \mathbf{R}_{ff}^{-1}(\tau_k - \hat{\tau}_0) \Lambda_{ss}^H(\hat{\tau}_k) = \sum_{l=0}^{N_p-1} c_l(\tau_l) \mathbf{x}(\tau_l) \Lambda_{ss}(\tau_l) \mathbf{R}_{ff}(\tau_l - \hat{\tau}_0) \mathbf{R}_{ff}^{-1}(\tau_k - \hat{\tau}_0) \Lambda_{ss}^H(\hat{\tau}_k) + \tilde{\mathbf{n}}(\tau) \quad (I)$$

WO 2005/013626 A2

(57) Abstract: A method of extracting data from a received signal including multi-path interference in a rake receiver. The method includes sampling and filtering the received signal; estimating a time delay (a) between paths for the filtered samples $\psi(\tau)$; and estimating channel complex coefficient (b) for the filtered samples $\psi(\tau)$. Transmitted data $\mathbf{x}(\tau_l)$ is extracted from the filtered samples $\psi(\tau)$ for each path l by solutions of simultaneous equations of the following filtered samples $\psi(\tau)$ equation (Formula I) wherein k is a particular path, N_p is the number of visible paths, (c) is a double convolution matrix of the filtering process and (d) is the pseudo inverse, $\Lambda_{ss}(\tau_l)$ is the product of spreading and scrambling matrices and (e) is the inverse, and (f) is noise.